Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

ACR Appropriateness Criteria® suspected lower urinary tract trauma.

Bibliographic Source(s)

Lockhart ME, Remer EM, Leyendecker JR, Eberhardt SC, Friedman B, Hartman MS, Hosseinzadeh K, Lazarus E, Oto A, Porter C, Sudakoff GS, Verma S, Expert Panel on Urologic Imaging. ACR Appropriateness CriteriaÂ® suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 10 p. [54 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Arellano RS, Francis IR, Casalino DD, Baumgarten DA, Curry NS, Dighe M, Fulgham P, Israel GM, Leyendecker JR, Papanicolaou N, Prasad S, Ramchandani P, Remer EM, Sheth S, Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2009. 7 p.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Suspected Lower Urinary Tract Trauma

Variant 1: Penetrating trauma, lower abdomen/pelvis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray retrograde cystography	8		
CT pelvis with bladder contrast (CT cystography)	8	A CT cystogram and retrograde cystogram are equivalent, but CT has become the first-line choice for acute trauma imaging. If CT has been performed, a CT cystogram is preferable.	

Radiologic Procedure	Rating	Comments	RRL*
CT pelvis with contrast	5	Routine enhanced CT alone is inadequate to evaluate the lower urinary tract for trauma. CT may be needed to evaluate extraurinary pelvic organs.	
X-ray pelvis	5	Perform this procedure if there is any question of the presence of a foreign body (e.g., bullet).	
X-ray retrograde urethrography	5	Perform this procedure if there is a suspected urethral injury (e.g., trajectory of knife or bullet).	
CT pelvis without contrast	4	Routine unenhanced CT is inadequate to evaluate the lower urinary tract for trauma, but it may detect free fluid to suggest further evaluation.	
CT pelvis without and with contrast	3	There is added radiation without increased diagnostic improvement beyond CT with contrast for trauma.	
Arteriography with possible embolization abdomen and pelvis	3	Use this procedure as a preliminary to embolotherapy if there is persistent bleeding.	Varies
X-ray intravenous urography	2	This procedure is inadequate for lower urinary tract trauma.	
US pelvis (bladder and urethra)	2	US is usually not definitive.	O
MRI pelvis without and with contrast	1	This procedure is not applicable to acute trauma.	O
MRI pelvis without contrast	1	This procedure is not applicable to acute trauma.	O
Tc-99m MAG3 scan kidney	1	This procedure is not applicable to acute trauma.	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Blunt trauma, lower abdomen/pelvis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray pelvis	9		
X-ray retrograde cystography	8		
CT pelvis with bladder contrast (CT cystography)	8	A CT cystogram and retrograde cystogram are equivalent, but CT has become the first-line choice for acute trauma imaging. If CT is performed, a CT cystogram is preferable.	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Radiologic Procedure	Rating	Comments	RRL*
X-ray retrograde urethrography	5	This procedure is necessary if a pelvic fracture is present or if the patient has hematuria and a negative cystogram or the inability to pass a Foley catheter.	
CT pelvis with contrast	5	Routine enhanced CT alone is inadequate to evaluate the lower urinary tract for trauma. It may be needed to evaluate extraurinary pelvic organs. Include delayed images to detect ureteral injury if there is periureteral fluid.	
CT pelvis without contrast	4	Routine unenhanced CT is inadequate to evaluate the lower urinary tract for trauma, but it may detect free fluid to suggest further evaluation.	
CT pelvis without and with contrast	3	This procedure adds radiation without increased diagnostic improvement beyond CT with contrast for trauma.	
Arteriography with possible embolization abdomen and pelvis	3	Use this procedure as a preliminary to embolotherapy for persistent bleeding.	Varies
X-ray intravenous urography	3	This procedure is inadequate for lower urinary tract trauma.	
US pelvis (bladder and urethra)	2	US is usually not definitive.	O
MRI pelvis without and with contrast	1	This procedure is not applicable to acute trauma.	O
MRI pelvis without contrast	1	This procedure is not applicable to acute trauma.	O
Tc-99m MAG3 scan kidney	1	This procedure is not applicable to acute trauma.	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Blunt perineal trauma in the male (straddle injury).

Radiologic Procedure	Rating	Comments	RRL*
X-ray retrograde urethrography	9		
X-ray pelvis	9	This procedure can be combined with retrograde urethrography.	
CT pelvis with contrast	7		
CT pelvis without and with contrast	3	This procedure adds radiation without increased	*Relative

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

Radiologic Procedure	Rating	Comments	RRL*
		diagnostic improvement beyond CT with contrast for trauma.	
CT pelvis without contrast	1	This procedure is not sufficient to diagnose urethral or bladder injury. It may detect free fluid or fracture.	
X-ray intravenous urography	1	This procedure is inadequate for lower urinary tract trauma.	
MRI pelvis without and with contrast	1	This procedure is not applicable to acute trauma.	O
MRI pelvis without contrast	1	This procedure is not applicable to acute trauma.	O
Arteriography with possible embolization abdomen and pelvis	1	Use this procedure as a preliminary to embolotherapy for persistent bleeding.	Varies
US pelvis (bladder and urethra)	1	A transabdominal US not definitive.	O
X-ray retrograde cystography	1		
Tc-99m MAG3 scan kidney	1	This procedure is not applicable to acute trauma.	
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Lower urinary tract injury can be caused by blunt, penetrating, or iatrogenic trauma. Injuries to the urologic system occur in 10% to 20% of patients who experience major trauma and can be the result of either blunt or penetrating injuries. In a series of 31,380 trauma patients with pelvic fractures, bladder injury was present in 3% to 4% of patients. Major bladder injury occurs in about 10% of patients suffering from an anterior arch pelvic fracture. The presence or absence of pelvic fractures alone does not always predict the type of lower urinary tract injury. Approximately 25% of intraperitoneal bladder ruptures occur in patients who do not have a pelvic fracture. Concurrent bladder ruptures are present in 10% to 29% of male patients with a traumatic rupture of the prostatomembranous urethra, with an average of 3.1 associated injuries per patient.

The degree of bladder distension with urine determines its shape and, to some degree, the injury it may sustain. Even relatively minor trauma can rupture the fully distended bladder; the empty bladder is seldom injured, except by crushing or penetrating wounds.

Gross hematuria indicates urologic trauma. The presence of gross blood at the urethral meatus strongly suggests urethral injury. A Foley catheter should not be inserted without first doing a retrograde urethrogram to ensure urethral integrity. Although grossly clear urine in a trauma patient without a pelvic fracture virtually eliminates the possibility of a bladder rupture, up to 2% of patients with a bladder rupture may have only microhematuria.

Exactly how much blood in the urine necessitates investigation is a point of controversy in the literature. Published data suggest that bladder imaging is not necessary for patients who have less than 50 red blood cells/high power field (RBC/hpf) on initial presentation and that no cases of bladder injury were missed, even when patients had more than 50 RBC/hpf without gross hematuria.

Authors of one study indicated that cystography used to evaluate blunt trauma should be restricted to patients with gross hematuria, which the authors defined as more than 200 RBC/hpf. They also recommended that a retrograde urethrogram should be done first in males who had a pelvic

fracture. In another study, 90% of 103 patients with a pelvic fracture did not have a bladder rupture; therefore, the authors concluded that cystography may be safely reserved for patients with pelvic fractures who are considered to be at high risk for such an injury. They limited cystography in pelvic fracture to patients with significant pubic arch involvement, gross hematuria, and/or hemodynamic instability.

Bladder Injury

The Consensus Panel of the Société Internationale D'Urologie has classified bladder injury into 4 categories:

- Type I: bladder contusion
- Type II: intraperitoneal rupture
- Type III: extraperitoneal rupture
- Type IV: combined injury

A bladder contusion (type I) is an incomplete tear of the bladder mucosa following blunt injury. The results of cystography are normal. The diagnosis of a bladder contusion is usually established by exclusion in patients who have hematuria following a blunt pelvic trauma for which no other cause is found. A bladder contusion is generally regarded as the most common form of bladder injury following a blunt trauma, but it is not considered to be a major injury.

An intraperitoneal rupture (type II) occurs when there is a sudden rise in intravesical pressure resulting from a blow to the lower abdomen of a patient with a distended bladder. The increased intravesical pressure results in a rupture of the weakest portion of the bladder, the dome, where the bladder is in contact with the peritoneal surface. Intraperitoneal rupture accounts for approximately one-third of major bladder injuries. Approximately 25% of such injuries occur in patients who do not have a pelvic fracture. On cystography, contrast material extravasation into the paracolic gutters and outlining loops of the small bowel will be present. On computed tomography (CT), there may be a "sentinel clot" at the bladder dome in up to 80% of patients.

An extraperitoneal bladder rupture (type III) is classically described as the result of a laceration of the bladder by a bone spicule in association with an anterior pelvic arch fracture. Recent data, however, have shown that cystograms in such patients often demonstrate that the site of contrast material extravasation is far removed from the site of fracture; thus, the validity of this mechanism has been questioned. Extraperitoneal rupture represents approximately 60% of major bladder injuries. Authors of one study further subdivided extraperioneal rupture into two groups. With simple extraperitoneal rupture, contrast extravasation is limited to the pelvic extraperitoneal space. With complex extraperitoneal rupture, contrast material extravasation may extend into the anterior abdominal wall, the penis, the scrotum, and the perineum. The presence of a complex extraperitoneal injury implies that the injury has disrupted the fascial boundaries of the pelvis. Such findings should not be mistaken as evidence of a coexisting urethral injury. Surgical repair of an extraperitoneal rupture varies by institution and whether other surgery is needed, but it can occur in more than half of patients.

A combined bladder injury (type IV) results when both intraperitoneal and extraperitoneal bladder injuries are present. This represents approximately 5% of major bladder injuries.

Urethral Injury

Injuries to the male urethra can be classified into 2 main categories according to their mechanism of injury: 1) those associated with a fracture of the anterior pelvic arch (usually involving the membranous urethra), and 2) those occurring as the result of a straddle injury (usually involving the bulbous urethra). Anterior urethral injuries are less common than posterior injuries.

Any female urethral injury is rare and is usually associated with pelvic disruption and/or vaginal laceration. The incidence of urethral injury with pelvic fracture ranges from 0% to 6% in women and can be as much as 10% in men. In a series of 31,380 trauma patients with pelvic fractures, urethral injury was present in 0.15% of women versus 1.5% of men. This is due to the relatively short length and anatomic position of the female urethra, which is hidden behind the osseous pubic arch, and the fact that it is more mobile, without significant attachment to the pubic bone.

In men who sustain a pelvic fracture, urethral injury occurs when the prostate is sheared from its connection to the urogenital diaphragm, as the puboprostatic ligaments are ruptured. The urethral injury is due to disruption of the soft tissues, rather than to a laceration by a bony spicule. A hematoma forms in the retropubic and perivesical spaces.

Straddle injuries occur as the result of a direct blow to the perineum when the urethra and corpus spongiosa are compressed between a hard object and the inferior aspect of the symphysis pubis. In most cases, there is no pelvic fracture. Straddle injuries result in either partial or complete rupture of the bulbous urethra.

Male urethral trauma has been classified based on the appearance of the retrograde urethrogram. This classification has been expanded to include all urethral trauma.

Urethral injuries associated with pelvic fracture include:

- Type I: posterior urethra stretched but intact
- Type II: urethra disrupted at the membranoprostatic junction above the urogenital diaphragm
- Type III: membranous urethra disrupted, with extension to the proximal bulbous urethra, and/or disruption of the urogenital diaphragm (most common)
- Type IV: bladder neck injury, with extension into the urethra
- Type IVa: injury to the base of the bladder, with periurethral extravasation simulating a true type IV urethral injury
- Type V: partial or complete pure anterior urethral injury

There has been recent work involving the treatment of pelvic fracture-related urethral injury involving the prostatic urethra, with extension into the bladder neck. It is important to recognize this type so that an early repair can be performed because these injuries do not heal spontaneously and are associated with incontinence.

Retrograde Urethrography (RUG)

Urethrography has improved our understanding of the mechanism of such injuries. In the past, a diagnosis of acute urethral injury often was based loosely on the clinical triad of 1) blood at the urethral meatus, 2) inability of the patient to void, and 3) a palpable urinary bladder. An inability to pass the catheter into the bladder was also considered diagnostic of a posterior urethral injury. It is now well established, however, that diagnostic catheterization is to be avoided, as it may convert a partial injury into a complete one. Because posterior urethral injuries are also seen with pelvic fractures, a retrograde urethrogram should be performed before inserting a catheter. Lack of pelvic and suprapubic tenderness; absence of penile, scrotal, or perineal hematoma; and a normal rectal examination support the integrity of the urethra. Patients with penetrating trauma to the penis should undergo RUG as the primary diagnostic procedure.

Cystography

The diagnosis of bladder rupture is usually easy with cystography, when the injected contrast is identified outside the bladder. Prior to the widespread acceptance of CT cystography as an equivalent alternative in evaluating bladder trauma, retrograde cystography has been called the "procedure of choice," "mandatory," "the only way," "examination of choice," "keystone," "mainstay," and "absolute indication."

Adequate distention of the urinary bladder is crucial to finding a perforation, especially in instances of penetrating trauma, as most instances of a false-negative retrograde cystogram were found in this situation. To exclude bladder injury, a filling volume of at least 350–400 mL contrast should be achieved. The catheter balloon should not be tightly maintained against the bladder neck because it could tamponade against a disruption and prevent detection of a leak in this region.

Cystography requires scout radiograph, filled view, and postdrainage radiograph, at a minimum. Fluoroscopic visualization during early filling should be obtained to avoid additional distension if a gross disruption is identified. Obliques are useful to avoid missing a small anterior or posterior injury. In approximately 10% of cases, bladder injury can be identified only with the postdrainage image. Cystography has an accuracy rate of 85% to 100% for detecting bladder injury. However, only a properly performed cystogram should be used to exclude bladder injury.

Intravenous Urography (IVU)

An IVU is inadequate for evaluating the bladder and urethra after trauma because the contrast material within the bladder is diluted and because the resting intravesical pressure is simply too low to demonstrate a small tear. IVU has a low accuracy, on the order of 15% to 25%. An accurate diagnosis of bladder rupture was made with IVU in only 5 of 23 study patients (22%). One study found an accurate diagnosis for only 5 of 32 (16%) patients, and another study found an accuracy rate for only 4 of 11 (36%).

Ultrasound (US)

Transabdominal US findings in bladder rupture and urethral evaluation with an endorectal probe have been described, but US has not been routinely used for evaluating the trauma patient. It is unlikely that a patient with significant posterior urethral or bladder rupture would tolerate evaluation by an endorectal probe. On the other hand, most or all serious trauma patients will likely be evaluated with CT because of its speed and accuracy of evaluation.

US can be used to evaluate associated visceral lesions, such as solid or hollow organ rupture and nonspecific peritoneal fluid. However, in a series of 128 acute trauma patients, 11 of 19 injuries that were missed by emergent US involved the genitourinary system. The detection of peritoneal fluid in the presence of normal viscera or the failure to visualize the bladder after the transurethral introduction of saline are considered highly suggestive of bladder rupture. As a practical matter, US is not definitive in bladder or urethral trauma and is almost never used.

Computed Tomography

CT cystography has become the first-line evaluation for bladder injury in the acute trauma setting. This technique refers to the retrograde instillation of a minimum of 350 cc of diluted contrast media into the bladder, followed by axial and coronal CT images of the pelvis. Unlike conventional cystography, no postdrainage CT images are needed. Authors of one study reported sensitivities of 95% overall but only 78% for intraperitoneal rupture. In another study with 100% sensitivity and 99% specificity for intraperitoneal bladder rupture, the specific site of dome injuries in 4 of 18 patients were identified only with multiplanar reconstructed images. A bladder contusion may not be visible by CT cystography. Routine CT, using excreted contrast only, cannot be relied on entirely to diagnose bladder rupture, even with a urethral catheter inserted and clamped. CT performed with excreted contrast only can demonstrate intraperitoneal or extraperitoneal fluid, but it cannot differentiate urine from ascites. However, the absence of pelvic ascites is strong evidence against a bladder rupture. As with IVU, the bladder is usually inadequately distended to cause extravasation through a bladder laceration or perforation during routine abdominal and pelvic studies. A negative study does not exclude bladder injury.

Researchers reviewed the examinations of 25 patients who received both cystograms and CT in the initial evaluation of a blunt abdominal trauma. Five had a bladder rupture; 3 were extraperitoneal, and 2 were intraperitoneal. All injuries were detected by both studies. The authors felt that delayed imaging or contrast instillation during CT can provide the adequate bladder distention needed to demonstrate contrast extravasation from the injury site. They continued to perform cystography in patients with compelling evidence of a bladder injury, but no extravasation was demonstrated by CT. The author of another study stated that either retrograde cystography or CT is the diagnostic procedure of choice for a suspected bladder injury.

The literature suggests that both conventional and CT cystography are equivalent, with physician preference and diagnostic protocols generally defining the method used. One study prospectively compared CT cystography and conventional cystography in patients with blunt abdominal trauma and found equally high sensitivity (95%) and specificity (100%) for both techniques. Although CT is not the technique of choice for urethral injuries, it is performed so frequently that urethral injuries are inevitably identified when CT is performed for pelvic trauma. Findings can include displacement of the prostate and bladder, extravasation of contrast media, and hematomas. Recently, researchers described the preliminary results of CT voiding urethrography using 16-multidetector CT and found a high correlation between the results of conventional RUG and CT voiding urethrography for evaluating urethral injuries.

Angiography

Angiography can be useful in identifying an occult source of bleeding and can guide its subsequent therapeutic embolization.

Nuclear Imaging

Because of its low resolution, nuclear imaging has not been applied to lower urinary tract injuries.

Magnetic Resonance Imaging (MRI)

Because of the difficulty of monitoring a seriously injured patient in a strong magnetic field MRI currently plays a small role in evaluating acute bladder and/or urethral trauma. MRI use has been described for later evaluation of urethral injury as an adjunctive tool for assessing complex urethral anatomic derangements.

Summary

- CT of the pelvis with bladder contrast (CT cystography) is the recommended imaging study for suspected lower urinary tract injury due to a penetrating trauma of the lower abdomen or pelvis, because CT scans of the abdomen and pelvis are frequently obtained for abdominopelvic trauma. Routine unenhanced CT scans of the abdomen or pelvis alone may be inadequate to assess for penetrating injuries to the lower urinary tract system. When a CT scan of the abdomen or pelvis in a trauma patient is not already being obtained, then either x-ray retrograde cystography or CT cystography is recommended to assess for bladder injury.
- X-ray retrograde cystography or pelvic CT with bladder contrast (CT cystography) are the recommended imaging studies for a suspected lower urinary tract injury due to blunt trauma to the lower abdomen or pelvis. RUG should be considered, to exclude urethral injury, when pelvic fracture is present. RUG should be performed in the setting of gross hematuria to exclude urethral injury before bladder catheterization.
- X-ray RUG is the examination of choice for a suspected blunt perineal trauma in the male (straddle injury) and should be performed for suspected urethral injury from a penetrating trauma.

Abbreviations

- CT, computed tomography

- MAG3, mercaptoacetyltriglycine
- MRI, magnetic resonance imaging
- Tc, technetium
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
▯	<0.1 mSv	<0.03 mSv
▯▯	0.1-1 mSv	0.03-0.3 mSv
▯▯▯	1-10 mSv	0.3-3 mSv
▯▯▯▯	10-30 mSv	3-10 mSv
▯▯▯▯▯	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Suspected lower urinary tract trauma

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Emergency Medicine

Nuclear Medicine

Radiology

Urology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of radiologic examinations for patients with suspected lower urinary tract trauma

Target Population

Patients with suspected lower urinary tract trauma

Interventions and Practices Considered

1. X-ray
    - Pelvis
    - Retrograde cystography
    - Retrograde urethrography
    - Intravenous urography
2. Computed tomography (CT) pelvis
    - With bladder contrast (CT cystography)
    - With contrast
    - Without contrast
    - Without and with contrast
3. Arteriography with possible embolization abdomen and pelvis
4. Ultrasound (US) pelvis (bladder and urethra)
5. Magnetic resonance imaging (MRI) pelvis
    - Without and with contrast
    - Without contrast
6. Technetium (Tc)-99m mercaptoacetyltriglycine (MAG3) scan kidney

Major Outcomes Considered

Utility of radiologic procedures in evaluation of suspected lower urinary tract trauma

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

Staff will search in PubMed only for peer reviewed medical literature for routine searches. Any article or guideline may be used by the author in the narrative but those materials may have been identified outside of the routine literature search process.

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

1. Articles that have abstracts available and are concerned with humans.
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 10 years unless the topic author provides other instructions.
3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis, and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid, but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence (study quality) for each article included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distribute surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The appropriateness rating scale is an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate"; 4, 5, or 6 are in the category "may be appropriate"; and 7, 8, or 9 are in the category "usually appropriate." Each panel member assigns one rating for each procedure for a clinical scenario. The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating.

If consensus is reached, the median rating is assigned as the panel's final recommendation/rating. Consensus is defined as eighty percent (80%) agreement within a rating category. A maximum of three rounds may be conducted to reach consensus. Consensus among the panel members must be achieved to determine the final rating for each procedure.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is proposed as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

This modified Delphi method enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. A more detailed explanation of the complete process can be found in additional methodology documents found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for evaluation of patients with suspected lower urinary tract trauma

Potential Harms

Adequate distention of the urinary bladder is crucial to finding a perforation, especially in instances of penetrating trauma, as most instances of a false-negative retrograde cystogram were found in this situation.

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Lockhart ME, Remer EM, Leyendecker JR, Eberhardt SC, Friedman B, Hartman MS, Hosseinzadeh K, Lazarus E, Oto A, Porter C, Sudakoff GS, Verma S, Expert Panel on Urologic Imaging. ACR Appropriateness CriteriaÂ® suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 10 p. [54 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1996 (revised 2013)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Urologic Imaging

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Arellano RS, Francis IR, Casalino DD, Baumgarten DA, Curry NS, Dighe M, Fulgham P, Israel GM, Leyendecker JR, Papanicolaou N, Prasad S, Ramchandani P, Remer EM, Sheth S, Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2009. 7 p.

Guideline Availability

Electronic copies: Available from the American College of Radiology (ACR) Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available in PDF from the ACR Web site.
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the ACR Web site.
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the ACR Web site.
- ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 90 p. Electronic copies: Available in PDF from the ACR Web site.
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available in PDF from the ACR Web site.
- ACR Appropriateness Criteria® suspected lower urinary tract trauma. Evidence table. Reston (VA): American College of Radiology; 2013. 17 p. Electronic copies: Available from the ACR Web site.

Patient Resources

None available

NGC Status

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